The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DENNIS W. SMITH, JOHN BALLATO, STEPHEN FOULGER and SURESH KUMAR MANTHATI

Appeal No. 2005-0711
Application No. 09/943,644

ON BRIEF

Before PAK, WALTZ, and TIMM, Administrative Patent Judges.
WALTZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal from the primary examiner's refusal to allow claims 16, 18, 19, 22 through 26, 28, 29 and 36 through 44 as amended subsequent to the final rejection (see the amendments dated June 25, 2003, and Sep. 25, 2003, with the respective Advisory Actions dated July 8, 2003, and Oct. 9, 2003; see also the Answer, page 3, ¶(4)). No other claims are pending in this application. We have jurisdiction pursuant to 35 U.S.C. § 134.

According to appellants, the invention is directed to a method for making an optical device, including the steps of providing a perfluorocyclobutane(PFCB)-based copolymer composition, coating this composition upon a substrate to form a first film, thermally curing this first film to form a substantially transparent polymeric core, and coating a cladding layer on the surface of the first film, where the cladding layer may also be a PFCB-based copolymer material (Brief, pages 2-3). A copy of illustrative independent claim 16 is reproduced below:

16. A method of making an optical device, comprising:

(a) providing a perfluorocyclobutyl-based copolymer composition having a solids content of greater than 50%,

(b) coating the perfluorocyclobutyl-based copolymer composition upon a substrate to form a first film,

(c) thermally curing the first film to form a thermoset film, in which the thermoset film comprises a substantially transparent polymeric core of an optical waveguide, and

(d) coating a second composition on the outer surface of the first film to form a second film, in which the second film is a clad of the optical waveguide.

The examiner has relied upon the following references as evidence of obviousness:

Kennedy et al. (Kennedy)	5,246,782	Sep. 21, 1993
Babb et al. (Babb)	5,426,164	Jun. 20, 1995
Shacklette et al. (Shacklette)	5,850,498	Dec. 15, 1998

Kaneko et al. (Kaneko) 6,438,307 B1 Aug. 20, 2002
(filed Mar. 24, 2000)

Fischbeck et al. (Fischbeck), "Singlemode optical waveguides using a high temperature stable polymer with low losses in the 1.55 μm range," *Electronics Letters*, pp. 518-19, Vol. 33, No. 6, Mar. 13, 1997;

Shah et al. (Shah)[1], "Fluoropolymer Nanotube Composites for Coatings and Nanoscopic Probes," p. 300, *Polym. Mater. Sci. & Eng. (ACS Div. PMSE)*, Vol. 82 (2000); and

Smith et al. (Smith), "Perfluorocyclobutane (PFCB) polyaryl ethers: versatile coatings materials," pp. 1-9, *Journal of Fluorine Chemistry*, 4310 (2000).

The claims on appeal stand rejected under 35 U.S.C. § 103(a) as unpatentable over Smith or Babb in view of Kennedy, Fischbeck, Shacklette, Shah, and Kaneko (Answer, pages 6 and 10).[2] Based on the totality of the record, we *reverse* the rejections on appeal essentially for the reasons stated in the Brief and those reasons set forth below.

---

[1]The examiner mistakenly refers to this reference as "Shaw" throughout the Answer (e.g., see page 5, ¶(9)). We will refer to this document by the correct name of "Shah," as done by appellants (e.g., Brief, page 5).

[2]For purposes of this appeal and judicial economy, we have combined the two rejections on appeal since they involve the same claims, the same statutory basis, and the same secondary references (see the Brief, page 2; the Advisory Action dated Oct. 9, 2003; and the Answer, page 2, ¶(3)). We also note that the final rejection using Babb '038 as a primary reference has been withdrawn by the examiner (Answer, pages 2 and 5).

OPINION

The examiner finds that Smith discloses the use of copolymers formed from pre-thermoset oligomeric solutions with 50% solids of "1-co-2" (see Scheme 2 on page 2) in optical waveguides (Answer, page 6). The examiner also finds that example 2 of Babb discloses a copolymer of 4,4'-bis(trifluoroethenyloxy)-alpha-methylstilbene and 1,1,1-tris(4'-trifluoroethenyloxyphenyl) ethane (TVE)(Answer, page 10).

With regard to the secondary references, the examiner finds that (1) Kennedy teaches spin coating and the effects of the percent solids on the thickness of PFCB polymers (Answer, pages 7 and 11); (2) Fischbeck teaches optical waveguide coating coatings of 10 microns for TVE-PFCB polymers in the formation of single mode waveguides (*id.*); (3) Shacklette teaches the use of upper cladding layers for optical waveguides (Answer, pages 8 and 11); (4) Shah teaches that the simple choice of co-monomer allows control of refractive indices, glass transition temperature and long term thermal stability (*id.*); and (5) Kaneko teaches that the polymers used in the core and cladding layers may be the same materials or different, but the cured clad polymer must have a refractive index less than that of the cured polymer core (Answer, page 8).

From these findings, the examiner concludes that it would have been obvious at the time of appellants' invention to coat other TVE-PFCB polymers, such as those disclosed by Smith or Babb, using the coating and baking in a nitrogen atmosphere as taught by Smith or Babb, to the thicknesses disclosed as useful for PFCB polymeric waveguide cores by Fischbeck or Shacklette, using the high solids content solutions taught by Kennedy based upon the direction of Shah that the composition of the monomer solution can control the refractive indices, glass transition temperature and long term thermal stability (Answer, pages 8-9 and 10-11). The examiner also concludes that it would have been obvious to add an upper cladding layer, such as a PFCB copolymer cladding layer, to improve the waveguiding properties of the article with a reasonable expectation of success since Kaneko teaches that the same materials can be used for the core and cladding layers and Shah teaches control of the refractive indices by optimizing the monomer composition (Answer, pages 9-10 and 11-12).

Appellants argue that there is no suggestion found in the references to process and utilize the known PFCB copolymer

materials to form the *core* of a core/clad optical waveguide. Based on the totality of the prior art on this record, we must agree.

Smith discloses PFCB-based copolymers useful as "optical cladding layers" (page 1, sentence bridging the two columns). Babb merely discloses generally that PFCB-based copolymers are useful as coatings (see cols. 20 and 22). Kennedy teaches that PFCB-based copolymers are useful in general in "optical waveguides" (e.g., col. 4, l. 30) but specifically as a cladding layer (col. 20, ll. 44-45 and 63-66). The examiner states that the "motivation to use PFCB copolymers in the core is found in Shaw [sic, Shah]" (Answer, page 17, citing p. 300, right column, lines 1-3 and Table 1). However, Shah is directed to PFCB-based copolymers useful as probes for microscopy (p. 300, right column, last full paragraph). The citation by the examiner on page 17 of the Answer merely refers to the teaching in Shah that various properties can be controlled by "simple choice of comonomer composition" (p. 300, right column, ll. 1-3).

The examiner also states that "PFCB polymeric waveguide cores" are taught by Fischbeck (Answer, page 8). However, as correctly noted by appellants (Brief, page 7), Fischbeck

discloses a single mode waveguide with a PFCB homopolymer as the sole layer, not a copolymer as required by the claims on appeal.

Additionally, the examiner has not established that Kaneko and Shacklette disclose or suggest PFCB-based copolymers as the core layer in a core/clad type of optical waveguide. As correctly argued by appellants (Brief, page 8), Shacklette teaches that the desired glass transition temperature of the core material is equal to or less than about 80°C., and this particular temperature can be "easily obtained by the skilled artisan by characterization and selection of the polymerizable component" (col. 7, ll. 45-59). In contrast, the PFCB-based copolymers disclosed by Smith are described as exhibiting "high glass transition temperature's [sic]" with values ranging from 165 to 350°C. (see page 1, right column, last paragraph; page 6, first five lines; and Table 3). Furthermore, the "1-co-2" PFCB-based copolymers disclosed by Shah have a glass transition temperature of 220°C. (see Table 1). Therefore we determine that the examiner has not established any motivation or suggestion to use PFCB-based copolymers as the core in the core/clad type of optical waveguide disclosed by Shacklette. *See In re Regel,* 526 F.2d 1399, 1403 n.6, 188 USPQ 136, 139 n.6 (CCPA 1975)("[T]here must be some logical reason apparent from

positive, concrete evidence of record which justifies a combination of primary and secondary references.").

As correctly argued by appellants on pages 8-9 of the Brief, Kaneko teaches that the optical material which may form the core or cladding "may be any optical material having a clear relationship between the irradiation amount of light and the refractive index corresponding to the irradiation amount of light" (col. 10, ll. 30-35; see also col. 9, ll. 6-17). On this record, the examiner has not established that PFCB-based copolymers, such as those of Smith or Babb, possess this "clear relationship" between the irradiation amount of light and the refractive index. Therefore we determine that the examiner has not established any motivation or suggestion for employing the PFCB-based copolymers of Smith or Babb as the core material in the core/clad arrangement of an optical waveguide disclosed by Kaneko. *See In re Regel, supra.*

For the foregoing reasons and those stated in the Brief, we determine that the examiner has failed to establish a *prima facie* case of obviousness based on the reference evidence. Accordingly, the rejections under section 103(a) over Smith or Babb in view of Kennedy, Fischbeck, Shacklette, Shah and Kaneko are reversed.

The decision of the examiner is reversed.

REVERSED

CHUNG K. PAK)
Administrative Patent Judge)
)
)
)
THOMAS A. WALTZ) BOARD OF PATENT
Administrative Patent Judge) APPEALS
) AND
) INTERFERENCES
)
)
CATHERINE TIMM)
Administrative Patent Judge)

Appeal No. 2005-0711
Application No. 09/943,644

DORITY & MANNING, P.A.
POST OFFICE BOX 1449
GREENVILLE, SC 29602-1449